

# DUAL-CHANNEL QUADRATURE HALL-EFFECT BIPOLAR SWITCH

GH1428

## ◆ General Description

The GH1428 is a dual-output-channel, bipolar switch with each channel comprising a separate complete Hall-effect circuit with dedicated Hall element and separate digital output for speed and direction signal processing capability. The independent Hall elements (E1 integrated with OUTPUT1, and E2 integrated with OUTPUT2) are photo-lithographically aligned to better than  $1.0\mu\text{m}$ . Maintaining this accurate mechanical location between the two active Hall elements eliminates the major manufacturing hurdle encountered in fine-pitch detection applications. The GH1428 is a highly sensitive, temperature-stable magnetic device, which is ideal for use in ring magnet-based speed and direction sensing systems used in harsh automotive and industrial environments.

The GH1428 contains two independent Hall effect switches, and has a monolithic IC that accurately locates the two Hall elements, E1 and E2, approximately 0.95mm apart. The digital outputs are  $90^\circ$  out of phase so that the outputs are in quadrature, with the proper ring magnet design. This allows for easy processing of speed and direction signals.

## ◆ Typical Application

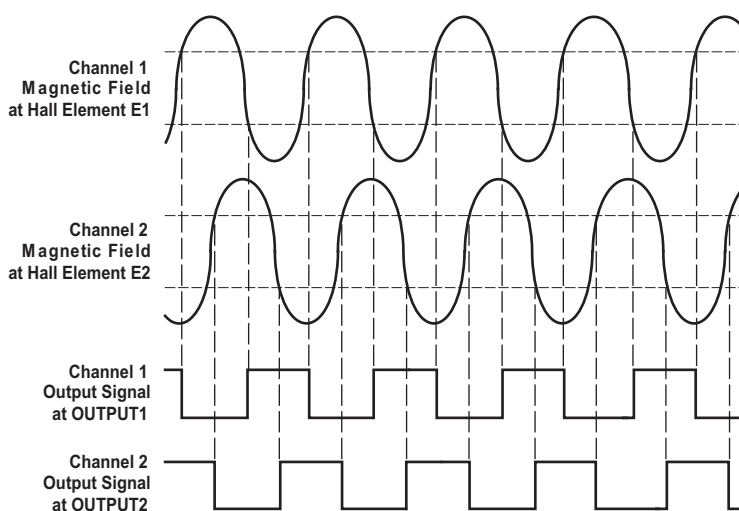


Fig.1 Typical Application of GH1428 for Speed and Direction detector.

## ◆ Features

- Two matched Hall effect switches on a single substrate.
- Wide operating voltage range: 3.8V~30V
- Open Collector Pre-Driver
- Maximum output sink current: 50mA
- Chip Power Reverse-Connection Protection
- Operating Temperature:  $-40^\circ\text{C}\sim+150^\circ\text{C}$
- Package: SIP-4L(TO-94)

## ◆ Applications

- Rotor Position Sensing
- Current Switch
- Encoder
- RPM Detection
- Brush-less DC Motor
- Brush-less DC Fan
- Revolution counting
- Speed and Direction measurement

Quadrature output signal configuration. The outputs of the two output channels have a phase difference of  $90^\circ$  when used with a properly designed magnet that has an optimal pole pitch of twice the Hall element spacing of 0.95 mm.

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## ◆ Absolute Maximum Rating (Note 1)

SYMBOL	PARAMETER	RATING
VCC	Supply Voltage	-30V to +40VDC
Vout (off)	Voltage externally applied to output	+40VDC max, OFF condition only -0.5 V min., OFF or ON condition
I <sub>o</sub> (sink)	Output "ON" Current	50 mA
PD	Power Dissipation	450 mW (SIP-4L)
Top	Operation Temperature Range	-40 to +150 °C
T <sub>st</sub>	Storage Temperature Range	-65 to +150 °C
B	Magnetic Flux	No limit.

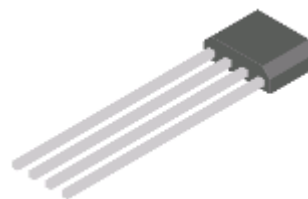
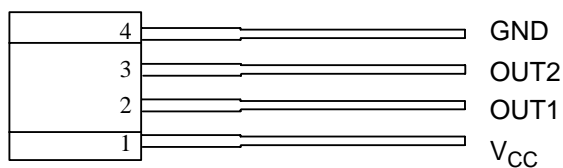
**Note 1:** Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

## ◆ Pin Description

PIN #	NAME	P/I/O	FUNCTION DESCRIPTION
1	VCC	P	Input Power Supply
2	OUT1	O	Output Stage of Open Collector
3	OUT2	O	Output Stage of Open Collector
4	GND	P	Ground

## ◆ Pin Configuration

SIP-4L(TO-94)  
(Top View)



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◆ Functional Block Diagram

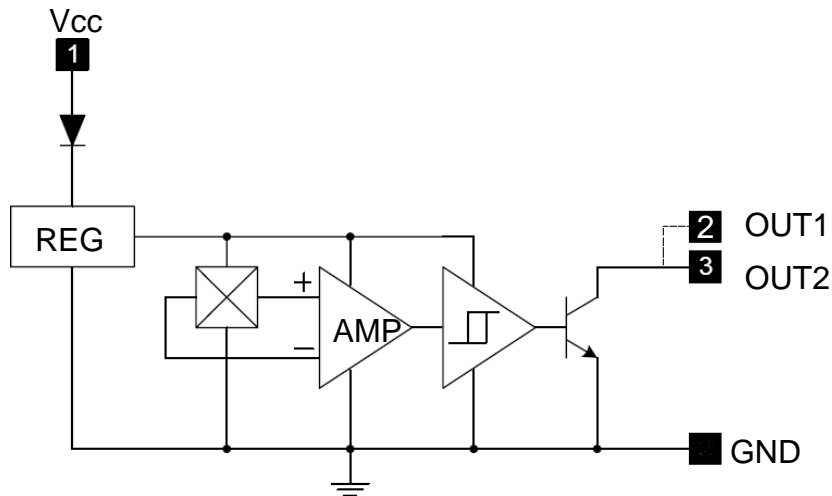


Figure 2. Function Block Diagram of GH1428

◆ Electrical Characteristics (TA = 25°C)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Vcc	Supply Voltage	Operating	3.8		30	V
VO(SAT)	Output Saturation Voltage	Vcc = 12V, OUT "ON", Io = 25mA		100	250	mV
		Vcc = 12V, OUT "ON", Io = 50mA		200	650	mV
Icc	Supply Current	Vcc = 4V~28V, OUT "OFF"		6.5	12	mA
I <sub>LE</sub>	Output Leakage Current (Leakage into sensor output)	Released			10	μA
Tr	Output Switching Time	Rise Time	RL=820Ω, CL=20pF	0.2		μS
Tf		Fall Time	RL=820Ω, CL=20pF	0.5		μS

◆ Test Circuit

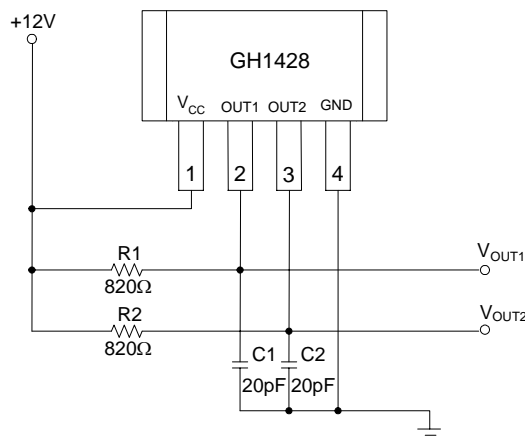


Fig 3. Test Circuit

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◆ **Magnetic Characteristics** (TA = 25°C, Vcc = 12V)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT
Bop	Operation Point	5	20	40	Gauss
Brp	Release Point	-40	-20	-5	Gauss
Bhy	Hysteresis	25	40	60	Gauss

◆ **Operating Characteristics**

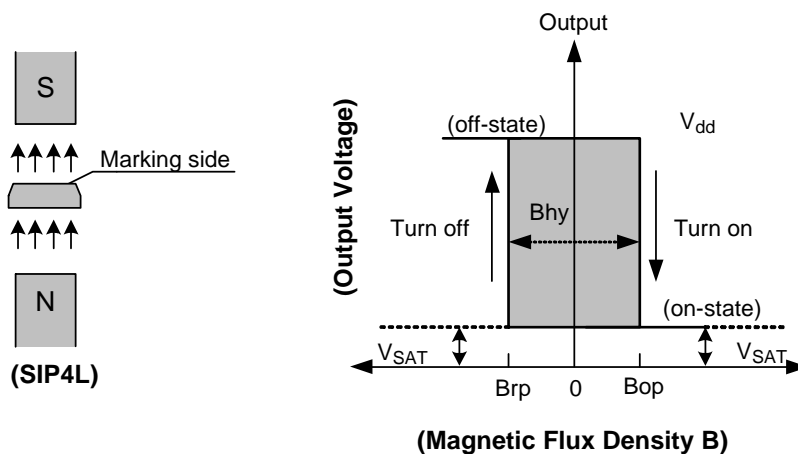


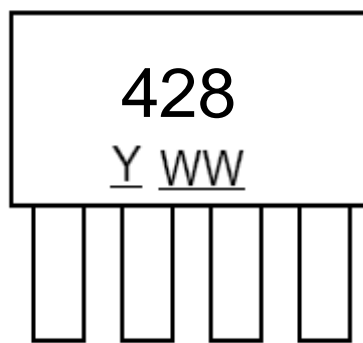
Figure 4. Operating Characteristics of GH1428

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◆ Marking Information

(Top View) SIP-4L(TO-94)



Y : Year : "8" = 2008

WW : Nth Week 01~52

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◆ Package Information

Package Type: SIP-4L(TO-94) for Bulk pack

SIP-4L(TO-94) Unit: mm

